



385-201A

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Docket No. OSI-112
Anticipated Classification of
this Application:
Class: 3309
Subclass: _____
Prior Application:
Examiner: J. Schmidt
Art Unit: 3309

CONTINUATION OR DIVISIONAL APPLICATION UNDER 37 CFR 1.60

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this New Application and the documents referred to as enclosed herein are being deposited with the United States Postal Service on this date June 2, 1997 in an envelope bearing "Express Mail Post Office To Addressee" Mailing Label Number EM370370893US addressed to: Box Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

HOWARD WONG

(Name of person mailing paper)

(Signature)

is a request for filing a [X] continuation [] divisional application under 37 CFR 1.68 of pending prior application 08/326,047 filed on October 19, 1994 of Robert R. Moore ET AL, for APPARATUS FOR ATTACHING SUTURE BONE, which is a Continuation of application no. 08/049,089, filed on April 16, 1993 of Robert R. Moore et al APPARATUS FOR ATTACHING SUTURE TO BONE, which is a Continuation-in-Part of application no. 395,604 filed June 8, 1992, issued as U.S. Patent No. 5,250,055.

1. [X] Enclosed is a **COMPLETE COPY** of the prior application, including the oath or declaration as originally filed. A declaration verifying it as a true copy appears in 123 below. (See 113 for drawing requirements.)
2. Name of applicant(s) (as originally filed and as last amended) and current correspondence address of applicant(s):
Robert R. Moore, 1897 National Avenue, Hayward, CA 94545
Arnold K. Cohn, 1415 Meadow, Glenview, IL 60025

3. [X] This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are
[X] the same
[] less than those named in the prior application and it is requested that the following inventor(s) identified above for the prior application be deleted:

4. [X] The inventorship for all the claims in this application are
 [X] the same
 [] not the same, and an explanation, including the ownership of the various claims at the time the last claimed invention was made, is submitted.
5. [X] A verified statement to establish small entity status under 37 CFR 1.9 and 1.27 [] is enclosed [X] was filed in the prior application no. 08/326,047 filed on October 19, 1994, and such status is still proper and desired (37 CFR 1.28(a)).
6. [X] The filing fee is calculated below:

CLAIMS AS FILED IN THE PRIOR APPLICATION LESS ANY CLAIMS
 CANCELLED BY AMENDMENT BELOW

CLAIMS AS FILED						
	CLAIMS REMAINING AFTER AMENDMENT OF 110	CLAIMS ADDED BY PRELIMINARY AMENDMENT OF 111	TOTAL CLAIMS FILED	NUMBER EXTRA*	RATE	BASIC FEE \$770
Total Claims	2	0	2	-20 = 0	× 22 =	\$0
Independent Claims	1	0	1	-3 = 0	× 80 =	\$0
0 FIRST PRESENTATION OF MULTIPLE DEP CLAIM					+260 =	\$ 0
TOTAL						\$ 770

Small Entity 50% Filing Fee Reduction (if applicable) \$385

* If the difference is less than zero, enter "0."

- [X] A check in the amount of \$385 is enclosed.

AUTHORIZATION TO CHARGE ADDITIONAL FEES

- [X] The Commissioner is hereby authorized to charge the following **ADDITIONAL** fees which may be required by this paper and during the entire pendency of this application to Account No. 12-1420. The Commissioner is hereby authorized to charge payment of any fees associated with this communication or credit any overpayment to Deposit Account No. 12-1420. A duplicate copy of this sheet is enclosed.
- [X] 37 CFR 1.16 (filing fees)
 [X] 37 CFR 1.16 (presentation of extra claims)
 [] 37 CFR 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)
 [] 37 CFR 1.17 (application processing fees)
 [] 37 CFR 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 CFR 1.311(b)).

9. INSTRUCTIONS AS TO OVERPAYMENT

- [X] credit Account No. 12-1420
 [] refund

10. [X] Cancel in this application original Claims 3, 4, 5 of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes).
11. [] A preliminary amendment is enclosed. (Claims added by this amendment have been properly numbered consecutively beginning with the number next following the highest numbered originally claimed in the prior application.)

12. [X] RELATE BACK - 35 USC 120: Amend the specification by inserting before the first line the sentence:

--This is a [X] continuation [] divisional of Application no. 08/326,047, filed October 19, 1994, which

is a Continuation of application no. 08/049,089 filed April 16, 1993, which is a Continuation-in-Part

of Application No. 07/895,604, filed June 8, 1992, now U.S. Patent No. 5,250,055.--

[Note to form user: lines for item 12 are intentionally spaced to permit Examiner amendments.]

13. DRAWINGS

- [] Transfer the drawings from the prior application to this application and abandon said prior application as of the filing date accorded this application. A duplicate copy of this sheet is enclosed for filing in the prior application file. (May only be used if signed by person authorized by 37 CFR 1.138 and before payment of base issue fee.)
- [X] New formal drawings are enclosed.

PRIORITY

- [] Priority of application no. _ filed on _ in _ is claimed under 35 USC 119.
- [] The certified copy of the priority application has been filed in prior application no. _ filed on _.

ASSIGNMENT

- [X] The prior application is assigned of record to Orthopedic Systems Inc.;
Assignment recorded in PTO on June 21, 1993, Reel 6579 Frame(s) 0369.
- [] The prior application is assigned, and the assignment (copy attached) was submitted to PTO for recording on _.
- [] An assignment of the invention to _ is attached. A copy of Form PTO-1595 (Recordation Cover Sheet) is also attached.
- [X] The power of attorney in the prior application is to the members of the firm of LIMBACH & LIMBACH L.L.P., 2001 Ferry Building, San Francisco, California, 94111, including Kathleen A. Frost, Reg. No. 37,326.
- a. [X] The power appears in the original papers in the prior application.
- b. [] Since the power does not appear in the original papers, a copy of the power in the prior application is enclosed.
- c. [] A new power has been executed and is attached.
- d. [X] Address all future communications to LIMBACH & LIMBACH L.L.P., Attn: Kathleen A. Frost, 2001 Ferry Building, San Francisco, California, 94111.

17. STATEMENT UNDER 37 CFR 3.73(B) (certification of title in assignee, if applicable, see MPEP 324)

- [] A statement satisfying the requirements of 37 CFR 3.73(b)
- [] is attached.
- [] was filed in the prior application.
- [] A copy of the statement previously filed in the prior application is attached.

18. [] An Information Disclosure Statement is enclosed with Form PTO-1449 (modified).

19. [] Enclosed is a Statement Requesting Deletion of Names of Persons Who are No Longer Inventors.

20. MAINTENANCE OF COPENDENCY OF PRIOR APPLICATION

(This item must be completed and the necessary papers filed in the prior application if the period set in the prior application has run).

- [] A petition, fee and response has been filed to extend the term in the pending prior application until _.
- [] A copy of the petition for extension of time in the prior application is attached.

21. CONDITIONAL PETITIONS FOR EXTENSION OF TIME IN PRIOR APPLICATION

(Complete this item and file conditional petition in prior application if previous item (20) not applicable).

- ☐ A conditional petition for extension of time is being filed in the pending prior application.
☐ A copy of the conditional petition for extension of time in the prior application is attached.

22. ABANDONMENT OF PRIOR APPLICATION

- ☐ Please abandon the prior application at a time while the prior application is pending or when the petition for extension of time or to revive in that application is granted and when this application is granted a filing date so as to make this application copending with said prior application.

23. ☒ I hereby verify that the attached papers are a true copy of prior complete application no. 08/326,047 and no amendments referred to in the oath or declaration filed to complete the prior application introduced new matter therein.

The undersigned declares further that all statements made herein of his or her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

LIMBACH & LIMBACH L.L.P.

5, 1997
s)

By:

Kathleen A. Frost
Kathleen A. Frost
Registration No. 37,326
Attorney(s) or Agent(s) of Record

APPARATUS FOR ATTACHING SUTURE TO BONE

Continuation-in-Part of Serial No. 07/895,604, Filed:
June 8, 1992

Background of the Invention

5 This invention relates to an apparatus for
attaching sutures to bone and more particularly to
doing so arthroscopically.

10 It is desirable to be able to attach a suture to
bone with the suture encircling a portion of the hard
material which forms the surface portion of the bone
so that the strength of that hard portion of the bone
forms a strong anchor for the suture. Apparatus for
anchoring sutures in this way is sold by Orthopedic
15 Systems Inc. under the name COHN Suture Fixation
Device. That apparatus provides two intersecting
drilled holes into the bone through which a suture
can be passed, but it is not readily adapted to
arthroscopic surgery because it requires that a large
opening be made for access to the bone.

Summary of Invention

20 In accordance with this invention, a suture can
be attached to the bone with the same final strength
that is achieved with the COHN S.F.D. and the
procedure may be performed arthroscopically. The
25 procedure is performed by insertion of a small
cannula to the bone through overlying soft tissue. A
drill guide with at least two generally parallel
bores is inserted in the cannula and used for
drilling two parallel holes in the bone through the
30 hard material near the surface of the bone down into
the soft interior material of the bone. The two
holes in the bone need not intersect.

A suture pusher is then inserted through one of the bores in the drill guide and operated to push a suture loop through the soft bone material from one hole to the other. At the tip of the suture pusher is a suture pushing end which is pivoted from one bore hole to the other using an actuating means. The suture pusher may take the form of a scissors-like device which has a set of scissors handles located at one end of a pair of parallel arms.

The suture pusher is provided with an eye to carry the suture or it may be provided with a notched end similar to that employed in the COHN S.F.D. When the suture pushing end is inserted through one hole and pivots to the other hole it carries the loop of the suture which may be retrieved with a hook through the second hole in the manner in which a suture is retrieved with a COHN S.F.D. Once the suture is in place extending into and out of the bone, the suture pusher and drill guide are withdrawn; knots may be tied in the suture and passed along the suture through the cannula to the bone; the ends of the suture are clipped off and the cannula is removed.

It may be possible to fix a suture using the drill guide alone without the cannula where the drill guide performs the function of the cannula, but it is preferred to use separate drill guides and cannulas so that knots can be passed down the suture to the bone while surrounding soft tissue is held back.

In this manner a suture can be attached to the bone firmly anchored by encircling the bridge of hard bone material between the two parallel drill holes, and the attachment is accomplished without leaving metal anchoring materials in the bone. The suture may be used for attaching any desired material to the bone as for instance where the end of a ruptured

tendon may be initially held to the bone by the cannula and then attached to the bone by the suture.

Detailed Description

5 In the accompanying drawings Fig. 1 is a side perspective view of the cannula with a schematic diagram of a shoulder to which a ruptured tendon is to be attached;

Fig. 2 is an exploded view of the apparatus of this invention;

10 Fig. 3 is a cross sectional view of the cannula with the drill guide in place;

Fig. 4 is a side elevational view of the apparatus of this invention with all parts assembled;

15 Fig. 5 is a side schematic representation of an alternative embodiment of the suture pusher of this invention;

Figs. 6 through 12 are a series of figures showing the sequence of steps performed in accordance with the invention.

20 Referring now in detail to the drawings and particularly to Figs. 1, 2 and 3, a cannula 10 having a handle 12 is used to form a passageway for arthroscopic surgery to attach a tendon 14 to a bone 16 through overlying soft tissue 18.

25 The end of the cannula may contain a removable plug 20 to facilitate insertion of the cannula through the soft tissue, and the inner end of the cannula may contain teeth 22 by which the tendon 14 may be grasped by the cannula. A drill guide 24 has
30 a handle 55 and contains two generally parallel bores 26 and 28 preferably 1/8 inch in diameter separated by a central web preferably 30 1/8 inch in diameter.

The suture pusher 32, which is constructed somewhat like a rongeur or arthroscopic grabber, is

comprised of a pair of scissors handles 56, 58 extending angularly from the distal ends of a pair of parallel arms 52, 54. A first embodiment of the suture pusher is shown in Figure 4 and Figures 9 through 12.

A suture pushing end 64 is connected to the proximal end of the parallel arms 52, 54. At the proximal end of the suture pushing end is an eye 38 through which a suture 41 is threaded as illustrated in Fig. 9. When the suture pushing member 64 is pivoted as described below, it carries the suture from one hole in the bone to the other as shown in Fig. 10. The distal end of the suture pushing end connects to parallel arm 52 at fixed pivot 70.

The suture pusher 32 of the first embodiment has four essential pivot points. Fixed pivot 60 joins scissors handles 56, 58 at their point of intersection. Parallel arm 54 is connected to scissors handle 58 at pivot 62 on the distal end and is connected to suture pushing end 64 at pivot 68. Fixed pivot 70 joins suture pushing end 64 to parallel arm 52.

To pivot the suture 41 from the first hole 42 to the second hole 40, scissors handle 58 is pivoted away from scissors handle 56 around fixed pivot 60. This causes parallel arm 54 to slide in the distal direction, towards the scissors handles, thereby pulling on suture pushing end 64 at pivot point 68. The suture pushing end 64 pivots about fixed pivot 70, carrying the suture 41 into the second hole 40.

Figure 5 is a schematic side representation of an alternative embodiment of the suture pusher. This embodiment is quite similar to the first embodiment but may be preferred because it allows the surgeon to pivot the suture from the first hole into the second

hole by closing the scissors handles rather than by opening them.

5 A pair of scissors handles 56a, 58a extends angularly from the distal ends of a pair of parallel arms 52a, 54a. Scissors handles 58a and 56a are joined by fixed pivot 60a, and scissors handle 58a is connected to parallel arm 52a at pivot 62a. At its proximal end, parallel arm 52a is attached to suture pushing end 64a at pivot point 68a. Fixed pivot 70a joins parallel arm 54a to suture pushing end 64a.

10 The proximal end of parallel arm 54 has a downwardly angled portion 72 which extends from the parallel arm at an obtuse angle and joins a second parallel portion 74 at the proximal end of the angled portion 72. The second parallel portion 74 of parallel arm 54a is parallel to the proximal portion of the suture pushing end 64a.

15 To use the alternative embodiment of the suture pusher, scissors handle 58a is pivoted around fixed pivot 60a in a distal direction, moving towards scissors handle 56a. This causes parallel arm 52a to slide in a proximal direction, thereby pushing suture pusher 64a at pivot 68a and causing the suture pushing end 64a to pivot around fixed pivot 70a. The suture (not shown) is thereby carried by the eye 38 into the second hole (not shown).

20 As explained above this apparatus is used as follows: The cannula 10 is inserted into the tissue as illustrated in Fig. 6 until it engages the bone where a suture is to be attached. Where the tendon 14 is to be attached to the bone by the suture the tendon is grasped and held to the bone by the cannula as the cannula is inserted and the drill guide 24 is then inserted as shown in Fig. 7. A drill is then used as shown in Fig. 8 to drill two holes 40 and 42

aligned with the bores 26 and 28 respectively of the drill guide.

5 A suture 41 is then threaded through the eye 38 in the suture pusher 32 and the suture pusher is forced into the bore 28 of the drill guide and into the hole 42, such that the two parallel arms 52 and 54 extend through one bore of the drill guide 24 as shown in Fig. 9. Pivoting scissors handle 58 around pivot pin 60 as described above causes the suture pushing end 64 to push the suture 41 from one hole 42 to the other hole 40.

10 Once the suture pushing member 64 penetrates from the hole 40 to the hole 42 as illustrated in Figs. 10 and 11, one end of the suture may be retrieved through the drill bore 26 by a suitable suture hook 50 as shown in Fig. 11.

15 Finally once the suture has been retrieved out through the bore 26, the suture pusher and the drill guide may be withdrawn. Knots are then tied in the suture and passed down the cannula to attach the tendon 14 to the bone 16, and the excess ends of the suture may be cut off and the cannula withdrawn leaving the suture attached as shown in Fig. 12.

20 While certain details of the invention have been illustrated and described herein it is obvious that 25 many modifications thereof may be made.

I claim:

1. Apparatus for pushing a suture from a first hole in hard bone to a second hole in hard bone, the apparatus comprising:

5 a primary arm having a first end adapted to be inserted in a hole in bone and a second end adapted to be manipulated by a surgeon,

a secondary arm mounted on the primary arm for generally longitudinal movement with respect thereto,

10 a suture pushing member pivotally connected to the primary arm near the first end thereof and connected to the secondary arm to be pivoted from a retracted position to a laterally projected position responsive to movement of the secondary arm
15 longitudinally of the primary arm.

2. Apparatus of claim 1 wherein the suture pushing member is pivotally connected at one end to the secondary arm and at an intermediate point to the primary arm and has a suture receiving hole in the
20 end remote from the secondary arm.

3. Apparatus for attaching a suture to bone under soft tissue comprising:

a drill guide having at least two generally parallel bores,

25 a suture pusher having a straight section adapted to extend through the drill guide and a suture carrying member pivotable to push a suture loop through soft bone material between two parallel holes in the bone, and

30 an actuator for pivoting the suture carrying member between the two parallel holes while the suture pusher is received in the drill guide.

4. The apparatus of claim 3 further comprising a cannula capable of receiving the drill guide.

ABSTRACT

5 An apparatus for use in arthroscopically attaching a suture to bone comprises a cannula and drill guide for use in drilling parallel holes in the bone and a scissors-like component for carrying a suture down one hole and pushing the suture through soft bone into the other hole where it can be retrieved.

DECLARATION FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Apparatus for Attaching Suture to Bone

the specification of which (check one) ☒ is attached hereto or _____ was filed on _____ as Application Serial No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed	
Yes	No
_____	_____

Number	Country	Day/Month/Year Filed
_____	_____	_____

Number	Country	Day/Month/Year Filed
_____	_____	_____

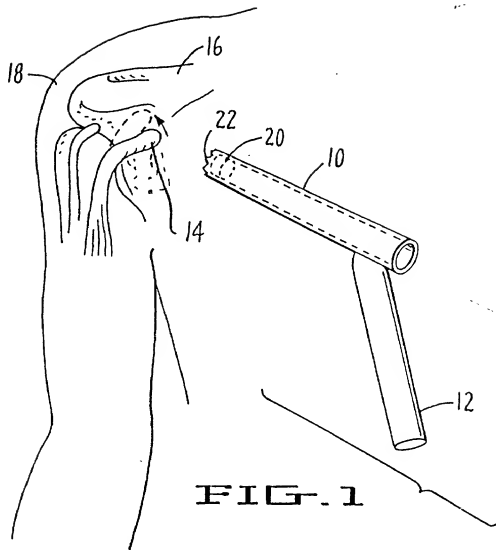
I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

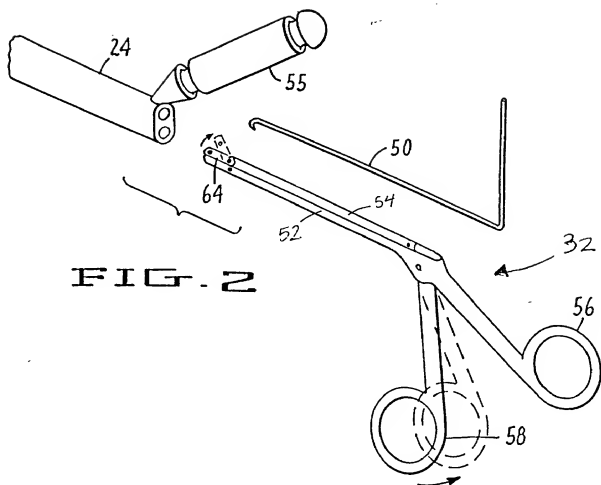
Application Ser. No.	Filing Date	Status: Patented, Pending, Abandoned
07/895,604	June 8, 1992	Pending

Application Ser. No.	Filing Date	Status: Patented, Pending, Abandoned
_____	_____	_____

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Robert R. MooreInventor's signature Robert R. Moore 3/31/93
DateResidence Hayward, California USACitizenship U.S.A.Post Office Address 1897 National Avenue, Hayward, CA 94545Full name of second joint inventor, if any, Arnold K. CohnInventor's signature Arnold K. Cohn 4/18/93
DateResidence GLENVIEW, IL USACitizenship U.S.A.Post Office Address 1415 Meadow, Glenview, IL 60025





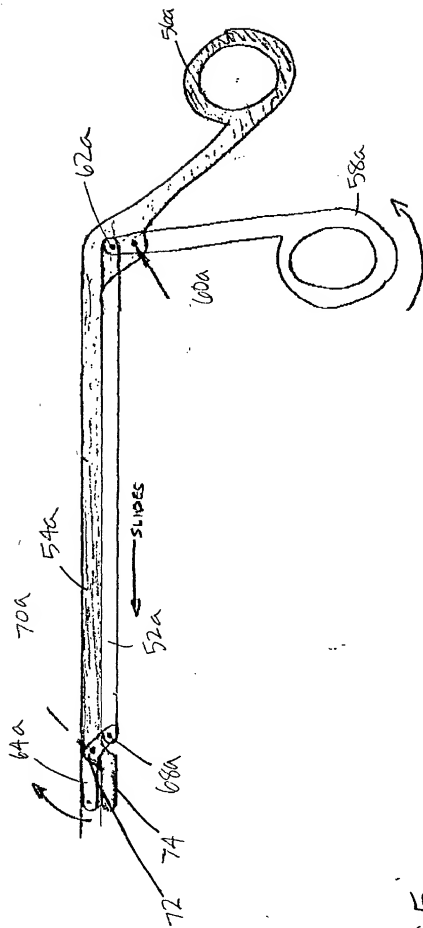


fig 5

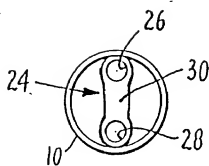


FIG. 3

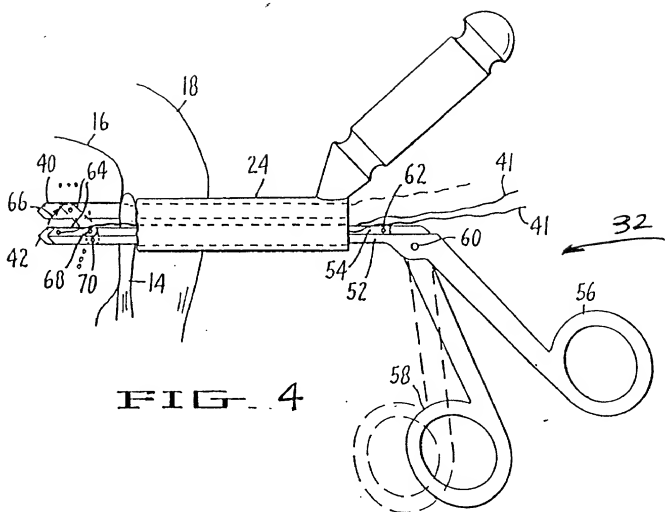


FIG. 4

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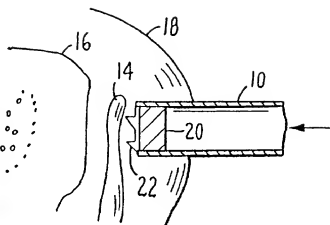


FIG. 6

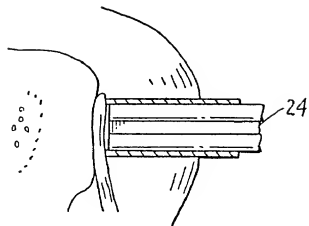


FIG. 7

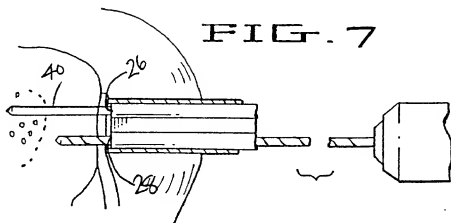


FIG. 8

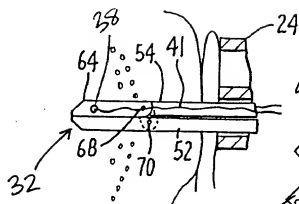


FIG. 9

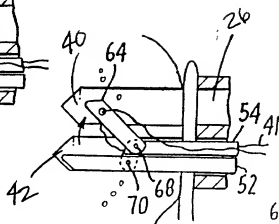


FIG. 10

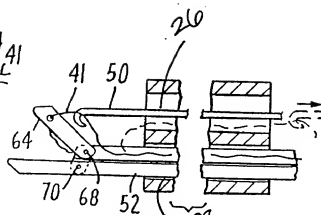


FIG. 11

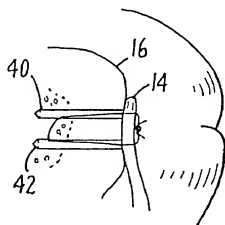


FIG. 12

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